

Novel Versatile Intelligent Drug Delivery, Phase I

Completed Technology Project (2007 - 2007)



Project Introduction

This SBIR project will demonstrate and develop a novel micro-pump capable of controlled and selective chemical transport. Phase I will create, characterize, and model a robust and readily fabricated low-power miniaturized pump achieving "forceless" dissolved ion transport compatible with microgravity conditions. The compact technology will be extremely versatile, low-cost, stable, easily tailorable, and readily scaleable to higher fluxes via structure duplication and application in parallel. The device will be physically stable, chemically inert, and pH insensitive while its small dimensions result in lower power consumption and reduced mass. The result will be a more versatile and general pump capable of moving a variety of drugs. Phase I will explore the pump performance, stability, and design optimization using selected ionic compounds as model transport subjects by running designed experiments exploring pump operations as a function of key pump structural and operation variables. This data will determine the controlling variables, their effects on the system performance, and will be utilized with first-principles system physics analysis to develop a pump operation model. This model will allow rapid technology configuration exploration, operation performance refinement, and will provide critical insights into preferred, better optimized, structures to be evaluated during Phase II.

Anticipated Benefits

Potential NASA Commercial Applications: Mature technology should find widespread industrial utility in small scale pumping and micro-actuator operation, separation of mixed charged species, fine chemical synthesis/purification, feedback controlled drug delivery, and sensor enhancement through selective preconcentration for example. Additionally, this technology could provide the basis for artificial muscle and/or nerve cell development.



Novel Versatile Intelligent Drug Delivery, Phase I

Table of Contents

Project Introduction	1
Anticipated Benefits	1
Organizational Responsibility	1
Primary U.S. Work Locations and Key Partners	2
Project Management	2
Technology Areas	2

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

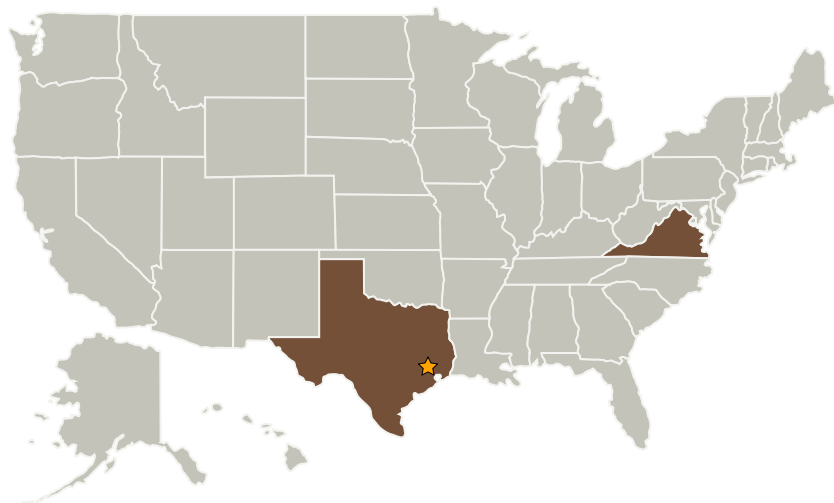
Small Business Innovation Research/Small Business Tech Transfer

Novel Versatile Intelligent Drug Delivery, Phase I

Completed Technology Project (2007 - 2007)



Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Tesla Laboratories	Supporting Organization	Industry	Arlington, Virginia

Primary U.S. Work Locations

Texas	Virginia
-------	----------

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Patrick I James

Technology Areas

Primary:

- TX14 Thermal Management Systems
 - └ TX14.2 Thermal Control Components and Systems
 - └ TX14.2.3 Heat Rejection and Storage